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**RUSSIAN INSECTS AND DISEASES  
THAT COULD CONTROL US WATERWEEDS**

Final Technical Report

by

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<p>A search for insects and diseases which attack Eurasian watermilfoil (<i>Myriophyllum spicatum</i> L.), waterchestnut (<i>Trapa natans</i> L.) and hydrilla (<i>Hydrilla verticillata</i> Royle) that are the noxious water weeds in the US was made from the literature, taxonomic collections and through consultations with specialists. Totally, 32 insect and 7 fungi species associated with the targeted weeds were found on the territory of the former Soviet Union. Most of Insecta are Coleoptera (14 species) and Lepidoptera (7 species). Besides, 5 Diptera, 4 Trichoptera, and 2 Homoptera species were revealed. Majority of above mentioned insects and all fungi are connected with <i>M. spicatum</i> (28 species). Particularly, three weevil species: <i>Phytobius leucogaster</i>, <i>Pelenomus canaliculatus</i> and <i>Bagous geniculatus</i>, which are reportedly oligophagous on <i>Myriophyllum</i> spp. may be considered as potential biocontrol agents.</p>				
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# RUSSIAN INSECTS AND DISEASES THAT COULD CONTROL US WATERWEEDS

## ABSTRACT

Eurasian watermilfoil (*Myriophyllum spicatum* L.), waterchestnut (*Trapa natans* L.) and hydrilla (*Hydrilla verticillata* Royle) that are the noxious water weeds in the US occur as native species in the Former Soviet Union (FSU). A search for the insects and diseases which attack these plants on the territory of the FSU was made from the literature, taxonomic collections and through consultations with specialists. Totally, 32 insect and 7 fungi species associated with the targeted weeds were found. Most of Insecta are Coleoptera (14 species) and Lepidoptera (7 species). Besides, 5 Diptera, 4 Trichoptera, and 2 Homoptera species were revealed. Majority of above mentioned insects and fungi are connected with *M. spicatum* (28 species). Particularly, three weevil species: *Phytobius leucogaster*, *Pelenomus canaliculatus* and *Bagous geniculatus*, which are reportedly oligophagous on *Myriophyllum* spp., may be considered as potential biocontrol agents.

Keywords: water weeds, biocontrol, *Myriophyllum*, *Trapa*, *Hydrilla*, Eurasia, insects, fungi.

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## INTRODUCTION

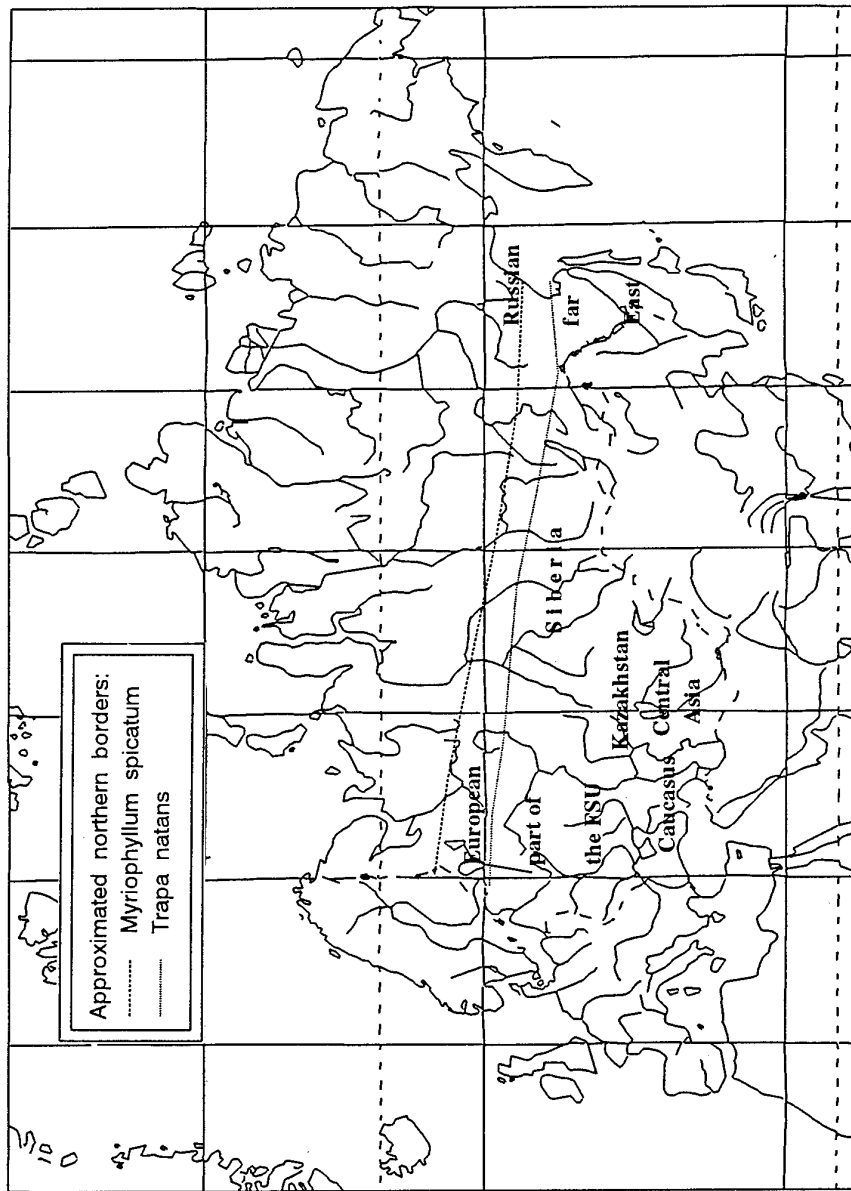
Three aquatic weeds: Eurasian watermilfoil (*Myriophyllum spicatum* L.), waterchestnut (*Trapa natans* L.) and hydrilla (*Hydrilla verticillata* Royle) that are the serious problems in the US occur as native species in Russia and other areas of the Former Soviet Union (FSU). This research has the goal of locating and employing insects and/or diseases to reduce the population densities of these plants in the US. For this purpose, a search for the insects and diseases which attack water plant species from the genera *Myriophyllum*, *Trapa*, and *Hydrilla* on the territory of the FSU was made from the literature, taxonomic collections and through consultations with specialists.

A short systematic list of the organisms connected with the targeted water weeds is enclosed. A comprehensive data on each of insect and fungi species is contained in the next two chapters. Each insect species is described by:

1. Synonyms.
2. Geographical distribution within and outside the FSU.
3. The targeted water weed association.
4. Host range, i.e. other plants association.
5. Kind of host association, particularly damaged part of the host plant.
6. References, i.e. the sources of information concerning given species.

Each of phytopathogenic fungi strain is characterized by the same way, but collection locality is described, instead of geographic distribution.

Totally, data from 78 references are included in the report, of which 49 references are in Russian. Besides, insect collection of Zoological Institute (St. Petersburg) was examined and assistance of 9 consulting specialists (taxonomists and ecologists from 3 research institutes) was used. Names and positions of all these scientists are recorded after the list of literature cited. In case when the contribution of a consulting specialist was particularly significant, his or her name is also included in 'References' in the end of a section presented information concerning given species.



Main geographic regions of the former Soviet Union and approximate northern borders of distribution of Eurasian watermilfoil (*Myriophyllum spicatum* L.) and waterchestnut (*Trapa natans* L.).

A SHORT ANNOTATED LIST  
OF ORGANISMS CONNECTED WITH THE TARGETED WEEDS

Abbreviations:

- M - connected with *Myriophyllum spicatum*  
T - connected with *Trapa natans*  
\* reportedly oligophagous on *Myriophyllum* spp.  
? supposedly, feeding on *Myriophyllum* spp. is occasional.  
! recorded as insect pest of agricultural plants.

I N S E C T A

H O M O P T E R A

A p h i d a e

- MT ! *Rhopalosiphum nymphaea* L.  
M ! *Aphis nasturtii* Kaltenbach

C O L E O P T E R A

C h r y s o m e l i d a e

D o n a c i i n a e

- M *Macroplea appendiculata* Panz.  
M *Macroplea mutica* Fabricius  
M *Neohaemonia voronovae* L. Medvedev

G a l e r u c i n a e

- T ! *Galerucella nymphaeae* L.  
T *Galerucella nipponensis* Laboissiere

A p i o n i d a e

N a n o p h y i n a e

- T *Nanophyes pubescens* Roelofs  
T *Nanophyes japonicus* Roelofs

C u r c u l i o n i d a e

C e u t o r h y n c h i n a e

- M ? *Rhinoncus albicinctus* Gyllenhal  
M \* *Phytobius leucogaster* Marsham  
M \* *Pelenomus canaliculatus* Fahraeus  
M *Eubrychius velutus* Beck

B a g o i n a e

- M ? *Bagous nodulosus* Gyllenhal  
M \* *Bagous geniculatus* Huchhuth

E r i r h i n i n a e

- M *Tanysphyrus lemnae* Paykull

T R I C H O P T E R A

L e p t o c e r i d a e

- M *Mystacides longicornis* L.

P h r y g a n e i d a e

- M *Phryganea grandis* L.  
M *Phryganea bipunctata* Retzius

L i m n o p h i l l i d a e

- M *Limnophyllus stigma* Curtis.

L E P I D O P T E R A

P y r a l i d a e

N y m p h u l i n a e

- MT    *Acentria ephemerella* Denis et Schiffermuller  
M    *Cataclysta lemnata* L.  
MT !   *Nymphula nymphaeata* L.  
M    *Nymphula stagnata* Donovan  
MT    *Paraponyx stratiotatum* L.  
M    *Paraponyx nivalis* Denis et Schiffermuller  
P y r a u s t i n a e  
M !   *Nomophila noctuella* Denis et Schiffermuller

D I P T E R A

C h i r o n o m i d a e

O r t h o c l a d i i n a e

- MT !   *Cricotopus silvestris* Fabr.  
C h i r o n o m i n a e  
M    *Endochironomus ex.gr. dispar* Meig.  
MT    *Endochironomus tendens* Thien (Fabricius)  
M    *Glyptotendipes gripekoveni* Kieff  
M    *Tanytarsus ex.gr. lauterborny* Kieff.

F U N G I

- M    *Fusarium oxysporum*  
M    *Fusarium nivale*  
M    *Fusarium solani*  
M    *Fusarium sambucinum*  
M    *Fusarium sp1*  
M    *Fusarium sp2*  
M    *Rhizoctonia aderholdii*

DATA ON INSECT SPECIES CONNECTED WITH THE TARGETED WEEDS

I N S E C T A

H O M O P T E R A

A p h i d a e

Rhopalosiphum nymphaea L.

(=Siphonaphis nymphaea)  
(=Rhopalosiphum najadum)  
(=Rh. alicmea)  
(=Aphis nymphaea)  
(=A. butoni)  
(=A. infuscata)  
(=A. prunaria)  
(=A. consona)  
(=A. prunorum)  
(=Hyadaphis sparganii)

Distribution: almost whole world.

Target weed species: *Myriophyllum spicatum*, *Trapa natans*.

Host range: feed also on other vascular water plants, at the first half of summer - on Rosaceae: cherry, plum, apricot, peach).

Kind of host association: feed on stem, may cause significant damage.

References: Mordvilko, 1929; Boerner, 1952; Bei-Bienko, 1964; Lekic, Mihajlovic, 1970; Kryzhanovskii, 1974; Spencer, Lekic, 1974; Heie, 1986; Ler, 1988.

Aphis nasturtii Kalténbach

Distribution: Europe, European part of FSU, Central Asia, N. America.

Target weed species: *Myriophyllum spicatum*.

Host range: polyphagous, was recorded on many plants including potato, tomato, pumpkin (insect pest and virus vector).

Kind of host association: feed on stem, may cause significant damage.

References: Tarbinskii, Plavilshchikov, 1948; Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974, Kryzhanovskii, 1974.



C O L E O P T E R A

C h r y s o m e l i d a e

D o n a c i i n a e

Macrolea appendiculata Panz.  
(= *Haemonia appendiculata* Latr.)

*Distribution:* Europe, European part of FSU, Siberia, Kazakhstan, Central Asia.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly polyphagous on various vascular water plants. Was recorded on *Potamogeton*, *Stratiotes*, *Ruppia*.

*Kind of host association:* larvae and adults feed on leaves, stem and roots.

*References:* Ogloblin, 1948; Bei-Bienko, 1965; Ogloblin, Medvedev, 1971; Kutikova, Starobogatov, 1977; Medvedev, Zaitzev, 1978; Lopatin, 1986; Medvedev, Roginskaya, 1988; Dubeshko, Medvedev, 1989.

Macrolea mutica Fabricius, *Macrolea mutica japona* Jacoby

*Distribution:* Europe, European part of FSU, Siberia, Caucasus, Kazakhstan, Central Asia, Russian Far East, Mongolia, Japan.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly polyphagous on various vascular water plants. Was recorded on *Zostera*, *Ruppia*, *Zannichellia*, *Potamogeton*.

*Kind of host association:* feed on plant tissue.

*References:* Lopatin, 1960; Bei-Bienko, 1965; Lopatin, 1977; Medvedev, 1982; Lopatin, 1986; Medvedev, Roginskaya, 1988; Dubeshko, Medvedev, 1989; Medvedev, 1992; Medvedev, Dubeshko, 1992.

Neohaemonia voronovae L. Medvedev, 1977

*Distribution:* Mongolia, Siberia?.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* was recorded also on *Potamogeton*.

*Kind of host association:* larvae feed on roots, adults feed on leaves.

*References:* Medvedev, 1977; Medvedev, Voronova, 1979; Medvedev, Zaitzev, 1980; Medvedev, 1982, Korotyaev, pers.comm.

## Galerucinae

### Galerucella nymphaeae L.

(= *Pyrrhalta nymphaeae* L.)

*Distribution:* Europe, Siberia, Kazakhstan, Central Asia, Mongolia, China, N. America.

*Target weed species:* *Trapa natans*.

*Host range:* polyphagous species, numerous host specific 'forms' with little morphological differences were described. Feeds mostly on water and hydrophyte plants. However, a form damaging to currant was reported from Siberia and a form damaging to strawberry was reported from Europe. In experiments *G. nymphaeae* is able to feed even on pod (*Phaseolus*), willow (*Salix*), and birch (*Betula*).

*Kind of host association:* larvae and adults feed on leaves, at high population density may cause serious damage.

*References:* Ogloblin, 1936; Isakov, 1954; Medvedev, 1955; Kozhanchikov, 1958; Gaevskaya, 1966; Kryzhanovskii, 1974; Lopatin, 1977; Medvedev, 1982; Lopatin, 1986; Medvedev, Roginskaya, 1988; Medvedev, Dubeshko, 1992.

### Galerucella nipponensis Laboissiere.

*Distribution:* Russian Far East, Korea, Japan.

*Target weed species:* *Trapa japonica* (=natans?).

*Host range:* supposedly polyphagous, was recorded also on *Brasiena*, *Ludwigia*, *Lycopus*.

*Kind of host association:* feed on plant tissue.

*References:* Dubeshko, Medvedev, 1989

## Apiionidae

### Nanophyinae

#### Nanophyes pubescens Roelofs

*Distribution:* Japan, Russian Far East.

*Target weed species:* *Trapa natans*.

*Host range:* unknown.

*Kind of host association:* unknown

*References:* Morimoto, 1964; Korotyaev, pers.comm.

#### Nanophyes japonicus Roelofs

*Distribution:* Japan, Russian Far East?.

*Target weed species:* *Trapa natans*.

*Host range:* unknown.

*Kind of host association:* Larvae live in the petiole, feed on plant tissue.

*References:* Morimoto, 1964; Korotyaev, pers.comm.

C u r c u l i o n i d a e

C e u t o r h y n c h i n a e

Rhinoncus albicinctus Gyllenhal

*Distribution:* Europe, European part of FSU, Siberia, China.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly oligophagous, mainly on *Polygonum amphibium* and related species, feeding on *M. spicatum* is occasional.

*Kind of host association:* larvae are steam-miners.

*References:* Bei-Bienko, 1965; Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974; Korotyaev, pers.comm.

Phytobius leucogaster Marsham

(= *Litodactylus leucogaster* Redtenbacher)

(= *L. griseomicans* Schwarz)

(= *L. myriophylli* Gyllenhal)

(= *Lithodactylus leucogaster* Marsham)

(= *Amalus leucogaster* auct.)

(= *Hydaticus leucogaster* Schoenherr)

*Distribution:* Europe, European part of FSU, Siberia, Kazakhstan, Central Asia, Russian Far East, N. America.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* possibly oligophagous on *Myriophyllum* spp., was recorded also on *M. verticillatum* and *M. sibiricum*.

*Kind of host association:* larvae and adults feed on leaves, stem and buds.

*References:* Reichardt, Ogloblin, 1940; Wesenberg-Lund, 1943; Ogloblin, 1948; Pavlovskii, Lepneva, 1948; Bei-Bienko, 1965; Gaevskaya, 1966; Spencer, 1974; Spencer, Lekic, 1974; Egorov, 1988; Isaev, 1994; Greed, Sheldon, 1994b; Caldara, O'Brien, 1995; Korotyaev, pers.comm.

Pelenomus canaliculatus Fahraeus

(= *Phytobius canaliculatus*)

*Distribution:* Europe, European part of FSU, Siberia, Kazakhstan, Mongolia, Japan.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* was recorded also on *M. verticillatum* L.

Possibly, oligophagous on *Myriophyllum* spp.

*Kind of host association:* larvae feed on leaves.

*References:* Ogloblin, 1948; Isaev, 1994; Caldara, O'Brien, 1995; Korotyaev, pers.comm.

Eubrychius velutus Beck

(= *E. aquaticus* Thomson)

(= *Lithodactylus velutus* Beck)

(= *Rhynchaenus velutus* Beck)

*Distribution:* Europe, Siberia, Kazakhstan, Central Asia, Mongolia, Russian Far East, N. America.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly polyphagous, was recorded also on *M. verticillatum* and *Potamogeton* sp.

*Kind of host association:* adults and larvae feed on leaves, stem and buds under water.

*References:* Reichardt, Ogloblin, 1940; Wesenberg-Lund, 1943; Bei-Bienko, 1965; Gaevskaya, 1966; Spencer, Lekic, 1974; Egorov, 1988; Isaev, 1994; Caldara, O'Brien, 1995; Korotyaev, pers.comm.

B a g o i n a e

Bagous nodulosus Gyllenhal

*Distribution:* Europe, Siberia, Central Asia, Mongolia.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* feed mostly on *Butomus umbellatus*, but was also reported from *Caltha palustris*. Feeding on *M. spicatum* is supposedly occasional.

*Kind of host association:* causes damage to the stem.

*References:* Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974; Isaev, 1994; Korotyaev, pers.comm.

Bagous geniculatus Huchhuth.

*Distribution:* South Europe, Caucasus, Central Asia, Pakistan.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly oligophagous on *Myriophyllum* spp. (was recorded also on *M. tuberculatum*, *M. indicum*).

*Kind of host association:* feed on plant tissue.

*References:* Khan and al., 1969; Spencer, Lekic, 1974, Korotyaev, pers.comm.

E r i r h i n i n a e

Tanysphyrus lemnae Paykull.

*Distribution:* Europe, European part of FSU, Siberia, Russian Far East, Japan, N. America.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* polyphagous, was recorded mostly on *Lemna*, *Spirodela*, *Caltha*.

*Kind of host association:* adults and larvae feed on leaves.

*References:* Bei-Bienko, 1965; Spencer, Lekic, 1974; Isaev, 1994; Caldara, O'Brien, 1995, Korotyaev, pers.comm.

TRICHOPTERA

Leptoceridae

Mystacides longicornis L.  
(=Phryganea longicornis L.)

Distribution: Europe, European part of FSU, Siberia, Kazakhstan, N. America.

Target weed species: *Myriophyllum spicatum*.

Host range: was recorded on various water plants.

Kind of host association: feeds on fresh and decaying plant tissue of algae and vascular plants.

References: Lepneva, 1940; Ogloblin, 1948; Kolenkina, 1951; McGaha, 1952; Lepneva, 1964; Lepneva, 1966; Gaevskaya, 1966; Fischer, 1966.

Phryganeidae

Phryganea grandis L.

Distribution: Europe, European part of FSU, Siberia.

Target weed species: *Myriophyllum spicatum*.

Host range: supposedly polyphagous on algae and on vascular plants. Have a seasonal change of food specialization. In the end of summer feed on larvae of other insects.

Kind of host association: may feed on plant tissues.

References: Kolenkina, 1951; Kashkin, 1958; Kashkin, 1961; Smirnov, 1962; Fischer, 1964; Lepneva, 1964, 1966; Sozska, 1975a, Sozska, 1975b; Ivanov, pers. comm.

Phryganea bipunctata Retzius  
(= *Ph. striata* auctorum)

Distribution: Europe, European part of FSU, Siberia, Russian Far East, Mongolia.

Target weed species: *Myriophyllum spicatum*.

Host range: supposedly polyphagous on algae and on vascular plants.

Kind of host association: larvae feed both on plant tissues and small invertebrates, *Myriophyllum* leaves are used to make a case for the first instar larva.

References: Pavlovskii, Lepneva, 1948; Kolenkina, 1951; Kachalova, 1960; Lepneva, 1964; Fischer, 1964; Lepneva, 1966; Ivanov, pers. comm.

## L i m n o p h i l i d a e

### Limnophyllus stigma Curtis.

*Distribution:* Europe, European part of FSU, Caucasus, Siberia, Russian Far East.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* supposedly polyphagous on algae and on vascular plants.

*Kind of host association:* probably use *Myriophyllum* leaves to make a larval case.

*References:* Lepneva, 1964; Lepneva, 1966, Ivanov, pers. comm.

## L E P I D O P T E R A

### P y r a l i d a e

#### N y m p h u l i n a e

### Acentria ephemerella Denis et Schiffermuller

(=*Acentropus niveus* Oliver)

(=*Acentria nivea* Oliver)

*Distribution:* Europe, European part of the FSU, Siberia, N.America.

*Target weed species:* *Myriophyllum spicatum*, *Trapa natans*.

*Host range:* polyphagous on various vascular water plants.

*Kind of host association:* first instar larvae mine the food plants, then caterpillars feed on plants, cutting stems and removing leaves.

*References:* Grunberg, 1909; Rimskii-Korsakov, 1940; Ogloblin, 1948; Pavlovskii, Lepneva, 1948; Kokocinski, 1963; Gaevskaya, 1966; Soszka, 1975a; Urban, 1975; Medvedev, 1986; Palm, 1986; Green and al., 1989; Ioganzen, Rostovtsev, 1994; Greed, Sheldon, 1994a; Newman, Maher, 1995.

### Cataclysta lemnata L.

*Distribution:* Europe, European Part of FSU, Caucasus, Central Asia.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* polyphagous on various vascular water and hydrophyte plants.

*Kind of host association:* young larvae made mines, then feed on leaves and cut stems.

*References:* Tarbinskii, Plavilshchikov, 1948; Kashkin, 1959; Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974; Medvedev, 1986.

Nymphula nymphaeata L.

(=Elophila nymphaeata L.)

(=Hydrocampa nymphaeata L.)

(=Nausinoe nymphaeata L.)

**Distribution:** Europe, European part of FSU, Caucasus, Siberia, Kazakhstan, Central Asia, Russian Far East, Mongolia, China, Japan.

**Target weed species:** *Myriophyllum spicatum*, *Trapa natans*.

**Host range:** polyphagous on various vascular water plants. Larvae may also cause damage to rice.

**Kind of host association:** larvae live inside the plant, feed on plant leaves, stem or flowers.

**References:** Berg 1950; Kashkin, 1959; Kashkin, 1961; Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974; Lvovski, pers. comm.

Nymphula stagnata Donovan

(=Parapoynx stagnata Donovan)

**Distribution:** Europe, European part of FSU, Caucasus, Siberia, Central Asia.

**Target weed species:** *Myriophyllum spicatum*.

**Host range:** supposedly polyphagous: was recorded also on *Sparganium* and *Nuphar*.

**Kind of host association:** larvae boring in leaves and stem.

**References:** Spencer, Lekic, 1974; Lekic, Mihajlovic, 1970; Palm, 1986, Lvovski, pers. comm.

Parapoynx stratiotata L.

(= Parapoynx)

(= P. stratiotata L. auct.)

**Distribution:** Europe, European part of FSU, Caucasus, Siberia, Kazakhstan, Russian Far East.

**Target weed species:** *Myriophyllum spicatum*, *Trapa natans*.

**Host range:** polyphagous on various vascular water plants.

**Kind of host association:** larvae feed on fresh leaves, more rarely on decaying plants

**References:** Karny, 1934; Ogloblin, 1948; Pavlovskii, Lepneva, 1948; Kashkin, 1959; Kashkin, 1961; Gaevskaya, 1966; Spencer, 1974; Spencer, Lekic, 1974; Urban, 1975; Soszka, 1975a; Soszka, 1975b; Medvedev, 1986; Lvovski, pers. comm.

Parapoynx nivalis Denis & Schiffermuller

(= Parapoynx)

**Distribution:** Europe, European part of FSU.

**Target weed species:** *Myriophyllum spicatum*.

**Host range:** supposedly polyphagous, feeding on *M. spicatum* is rare.

**Kind of host association:** feed on plant leaves.

**References:** Lekic, Mihajlovic, 1970; Spencer, Lekic, 1974; Medvedev, 1986.

P y r a u s t i n a e

Nomophila noctuella Denis et Schiffermuller

Distribution: Europe, European part of FSU, Central Asia,  
Pakistan, N. America.

Target weed species: *Myriophyllum spicatum*.

Host range: polyphagous, may cause damage to alfalfa and clover.

Kind of host association: larvae feed on leaves.

References: Hasenfuss, 1960; Spencer, Lekic, 1974; Medvedev,  
1986, Lvovski, pers. comm.

D I P T E R A

C h i r o n o m i d a e

O r t h o c l a d i i n a e

Cricotopus silvestris Fabr.

Distribution: almost whole world, including FSU.

Target weed species: *Myriophyllum spicatum*, *Trapa natans*.

Host range: associated with various vascular water and  
hydrophyte plants, may cause damage to rice.

Kind of host association: ubiquitous species associated with  
macrophytes, larvae live in leaf mines, feed on fragments of  
living and dead plant tissue, periphytic algae, and small  
animals.

References: Chernovskii, 1949; Gosteva, 1950; Thienemann, 1954;  
Shilova, 1955; Konstantinov, 1958; Gaevskaya, 1966; Pankratova,  
1970; Spencer, Lekic, 1974; Soszka, 1975a, Soszka, 1975b;  
Cranston, 1995; Prat, Rodriques-Capitulo, 1995.

C h i r o n o m i n a e

Endochironomus ex.gr. dispar Meig.

Distribution: Europe, European part of FSU.

Target weed species: *Myriophyllum spicatum*.

Host range: associated with various vascular water plants.

Kind of host association: miner, often using tunnels made by  
other animals, mostly stems appeared to be infested. Larvae  
feed on detritus, small animal remains, also on fresh and dead  
plant tissue.

References: Chernovskii, 1949; Konstantinov, 1958; Soszka, 1975a;  
Soszka, 1975b; Urban, 1975; Starostin, 1992.



Endochironomus tendens Thien (Fabricius)

*Distribution:* Europe, European part of FSU, Siberia, Russian Far East, Central Asia, N. America.

*Target weed species:* *Myriophyllum spicatum*, *Trapa natans*.

*Host range:* associated with various vascular water plants.

*Kind of host association:* feed mostly on detritus, small contribution of animal remains and periphytic algae. The tissue of plants slightly contributed to the food.

*References:* Chernovskii, 1949; Thienemann, 1954; Konstantinov, 1958; Gaevskaya, 1966; Bei-Bienko, 1969; Soszka, 1975a; Soszka, 1975b; Kutikova, Starobogatov, 1977; Cranston, 1995; Prat, Rodrigues-Capitulo, 1995; Caspers, Heimbach, 1995.

Glyptotendipes gripekoveni Kieff

*Distribution:* Europe, European part of FSU, W. Siberia.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* associated with various vascular water plants.

*Kind of host association:* Larvae feed mainly on periphyton, boring mines mostly in stems, the tissue of plants slightly contributed to the food.

*References:* Chernovskii, 1949; Ioganzen, Rostovtsev, 1994; Soszka, 1975a; Soszka, 1975b; Urban, 1975.

Tanytarsus ex.gr. lauterborny Kieff.

*Distribution:* Europe, European part of FSU, Central Asia.

*Target weed species:* *Myriophyllum spicatum*.

*Host range:* associated with various vascular water plants.

*Kind of host association:* feed on fresh and dead tissue of vascular plants, algae, detritus, animals.

*References:* Chernovski, 1949; Konstantinov, 1958; Soszka, 1975a, Soszka, 1975b; Starostin, 1992,

DATA ON PATHOGENIC FUNGI STRAINS  
ISOLATED FROM THE TARGETED WEEDS  
(strains with experimentally proved pathogenity)

Fusarium oxysporum

Collection place: Vorskla river, Belgorod district, European part of FSU.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: medium virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Fusarium nivale

Collection place: brook in Pendzhikent, Tadzhikistan, Central Asia.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: medium virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Fusarium solani

Collection place: shallow lake in Zeravshan reservation, Samarkand district, Uzbekistan, Central Asia.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: low virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Fusarium sambucinum

Collection place: pond near Novgorod, European part of FSU.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: low virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Fusarium sp1

Collection place: brook in Pendzhikent, Tadzhikistan, Central Asia.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: low virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Fusarium sp2

Collection place: shoal-water in Zeravshan reservation, Samarkand district, Uzbekistan, Central Asia.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: low virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

Rhizoctonia adersholdii

Collection place: shallow pond in Zeravshan reservation, Samarkand district, Uzbekistan, Central Asia.

Target weed species: *Myriophyllum spicatum*.

Host range: host specificity was not tested.

Kind of host association: medium virulence.

References: Dolgovskaya et al., 1994; Labutova, pers.comm.

## C O N C L U S I O N S

Totally, 32 insect and 7 fungi species associated with the targeted water weeds (*Myriophyllum spicatum*, *Trapa natans* and *Hydrilla verticillata*) were recorded from the territory of the Former Soviet Union (FSU). Most of Insecta are Coleoptera (14 species) and Lepidoptera (7 species). Besides, 5 Diptera, 4 Trichoptera, and 2 Homoptera species were found.

Majority of above mentioned insects and all fungi are connected with *M. spicatum* (35 species), 10 of insect species were recorded on *T. natans*, while we failed to find any reports on insects or fungi associated with *Hydrilla verticillata* in FSU. The reason supposedly is that *M. spicatum* and *T. natans* are widespread and rather common across the whole FSU territory excluding North (see map at p.3), while *Hydrilla* is represented by several disjunctive patches and rarely come into the view of insect collectors. It is believed that special field search will revealed a lot of insect and fungi species connected with all of three targeted weeds.

Concerning the possibility of using for biological control, 6 insect species are unsuitable (*Rhopalosiphum nymphaea*, *Aphis nasturtii*, *Galerucella nymphaeae*, *Nymphula nymphaeata*, *Nomophila noctuella*, *Cricotopus silvestris*) because these insects were recorded as causing damage to agricultural plants. Besides, all of Trichoptera, Lepidoptera and Diptera species connected with targeted water weeds are polyphagous and some of them are potentially dangerous to any culturing plant which may be partly covered with the water or even grows in damp soil. Moreover, all of Trichoptera and most of Diptera species connected with *M. spicatum* and *T. natans* are euryphagous: their larvae are able to feed both on fresh and decaying tissue of algae and vascular plants, and even on small animals, using water weeds rather as a case or as a shelter, than as a food.

On the contrary, some of Coleoptera, particularly Curculionidae species seems to be promising for weed biocontrol. *Phytobius leucogaster*, *Pelenomus canaliculatus* and *Bagous geniculatus*, reportedly oligophagous weevils fed on *Myriophyllum* species may be considered as potential biocontrol agents. *Ph. leucogaster* is a very wide spread species which was recorded also in North America. At present, *P. canaliculatus* and *B. geniculatus* are absent in US and may be proposed for the further investigations. Primarily, laboratory tests are necessary to check their specificity. Generally speaking, laboratory testing may significantly enlarge the host range of all insect species under study.

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